

GPSTMIII vs. Arthrex ACPTM Output Characterization

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Introduction:

Platelet-rich plasma (PRP) has proven to be therapeutic in a number of different orthopedic treatments (1-3). The mechanism of action for this treatment could be from growth factors released from concentrated platelets. The GPS[®]III System is a platelet separator that produces 6 ml of platelet rich plasma (PRP) from 60 ml of whole anticoagulated blood. The Arthrex ACPTM Double Syringe System is a competitive device that produces 2-4 ml of “autologous conditioned plasma” from 10 ml of whole anticoagulated blood. The ACPTM is marketed on cost effectiveness and ease of use.

A comparison study was performed on the GPS[®]III and the Arthrex ACPTM systems to assess the ability of each device to concentrate the platelets and deliver growth factors.

Methods:

Fresh whole blood was extracted from 9 healthy human donors into 3 syringes containing anticoagulant (ACD-A). The first syringe was loaded with 52 ml of blood and 8 ml ACD-A into the GPS[®]III device, the second syringe was used as a baseline sample (1.6 ml ACD-A and 10.4 ml blood), and the third syringe was an Arthrex ACPTM double syringe (1 ml ACD-A and 9 ml blood). Nine disposables from each manufacturer were processed according to manufacturer’s instructions. Complete blood counts (CBCs) were performed on the samples, and the presence of growth factors was evaluated using the ELISA method.

Results:

The average PRP output volume from the GPS[®]III concentrator was 6.675 ml and the average PRP output volume from the ArthrexTM system was 1.66 ml. The PRP from the GPS[®]III system demonstrated a percent recovery of 85% (Table 1). The PRP output from the ACPTM system contained fewer platelets than the baseline sample (Fig. 1). The growth factor measurements further revealed that the PRP from the ACPTM system contained fewer growth factors than the baseline whole blood (Fig. 2 and 3). All figures are averages \pm 1 standard deviation.

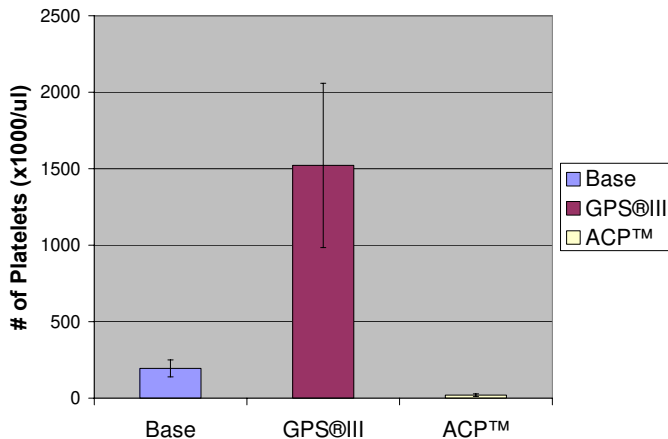


Figure 1: Average platelet concentration from both platelet concentration systems and the base sample.

Table 1: GPS[®]III vs. ACPTM percent recovery in PRP

	GPS [®] III	ACP TM
Platelets (x1000/ul)	85%	2%
VEGF (pg/ml)	36%	1%
PDGF-BB (ng/ml)	72%	1%
PDGF-AB (ng/ml)	75%	2%
EGF (pg/ml)	88%	2%
TGF- β 1 (ng/ml)	43%	1%
TGF- β 2 (pg/ml)	22%	2%
IGF-1 (ng/ml)	14%	3%

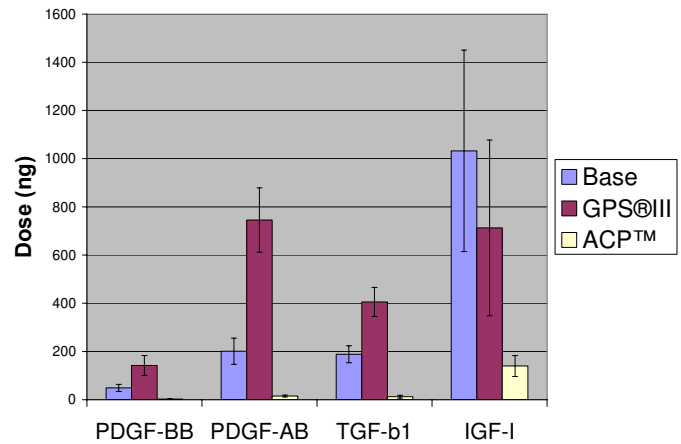


Figure 2: Average growth factor dose.

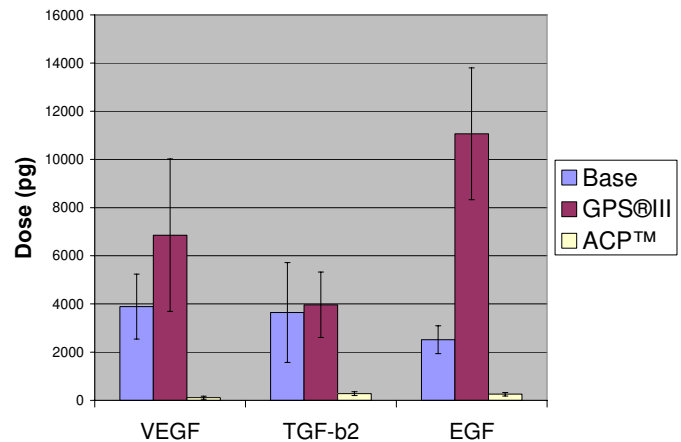


Figure 3: Average growth factor dose (cont.).

Conclusion:

The GPS[®]III concentrates platelets and consequently produces a high concentration of growth factors that can be delivered to a patient. While it may be true that the ACPTM system is cheap and simple to use, these findings suggest that not only are platelets not being concentrated, but the end product actually contains fewer growth factors than levels found in whole blood.

References:

- Berghoff WJ *et al.*, Orthopedics 2006;29(7):590-606.
- Bielecki T *et al.*, Eur Surg Res 2008 Feb 15;40(3):289-96.
- Mehta S *et al.*, J Orthop Trauma 2008 Jul;22(6):432-8.

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